

# A risk assessment for visual only meat inspection of both indoor and outdoor pigs within the UK

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## Abstract

The current system of post-mortem inspection using the typical macroscopic inspection techniques is ineffective in identifying the most common foodborne illness risks, e.g. Salmonella or Campylobacter. Therefore, there is a need to adopt a more appropriate, risk-based approach to meat inspection. One specific example of modifying traditional inspection techniques to represent a more cost-effective approach to meat inspection is the allowance in EC Regulation 854/2004 for only visual inspection of pigs that have been reared under controlled housing conditions since weaning. However, the definition of controlled housing excludes outdoor pig production from visual-only meat inspection, and hence so far the UK has yet to introduce this method of meat inspection into abattoirs because of the associated complications of having a large outdoor pig herd. We have therefore conducted a qualitative risk assessment to assess the comparative risks to public and animal health from allowing visual-only inspection of both indoor and outdoor pigs.

In order for visual-only inspection to be of higher risk than traditional meat inspection, the sensitivity of detection of a condition must significantly decrease for visual-only inspection. In addition, in order for outdoor pigs to pose a greater risk than indoor pigs, then the condition must be more prevalent in the former than the latter. From a large number of diseases/conditions originally identified as worthy of investigation, only two (TB and endocarditis) were considered to be of public or animal health risk and would be less likely to be spotted through visual-only inspection. It was determined that prevalence of TB in outdoor pigs was higher than in indoor pigs; however, endocarditis prevalence was higher in indoor pigs than outdoor pigs. Despite higher rates of TB in outdoor pigs, there was no discernable risk to public or animal health from TB-infected pigs. It was therefore concluded that visual-only inspection of both indoor and outdoor pigs in the UK posed a negligible risk to public or animal health.

## Introduction

The current system of post-mortem inspection using the typical macroscopic inspection techniques is ineffective in identifying the most common foodborne illness risks, e.g. Salmonella and Campylobacter. Therefore, there is a need to adopt a more appropriate, risk-based approach to meat inspection. One specific example of modifying traditional inspection techniques to represent a more cost-effective approach to meat inspection is the allowance in EC Regulation 854/2004 for only visual inspection of pigs that have been reared under controlled housing conditions since weaning. However, the definition of controlled housing excludes outdoor pig production from visual-only meat inspection, and hence so far the UK has yet to introduce this method of meat inspection into abattoirs because of the associated complications of having a large outdoor pig herd. We have therefore conducted a qualitative risk assessment to assess the comparative risks to public and animal health from allowing visual-only inspection of both indoor and outdoor pigs.

## Material and Methods

Pigs that are raised under controlled conditions since weaning may be visually-only inspected post-mortem under current regulations; among other criteria the two major, relevant conditions that define "controlled" are whether the pigs were raised indoors and in an integrated system (EC 854/2004). Expert opinion from the UK pig industry suggests that all quality-assured farms, regardless of indoor or outdoor production type, would meet the criteria for a fully integrated system given the traceability between farm and abattoir provided by Food Chain Information (FCI) and the Animal Movement Licence Systems (AMLs). Therefore, for the purpose of this document and the UK situation, we define indoor and outdoor respectively:

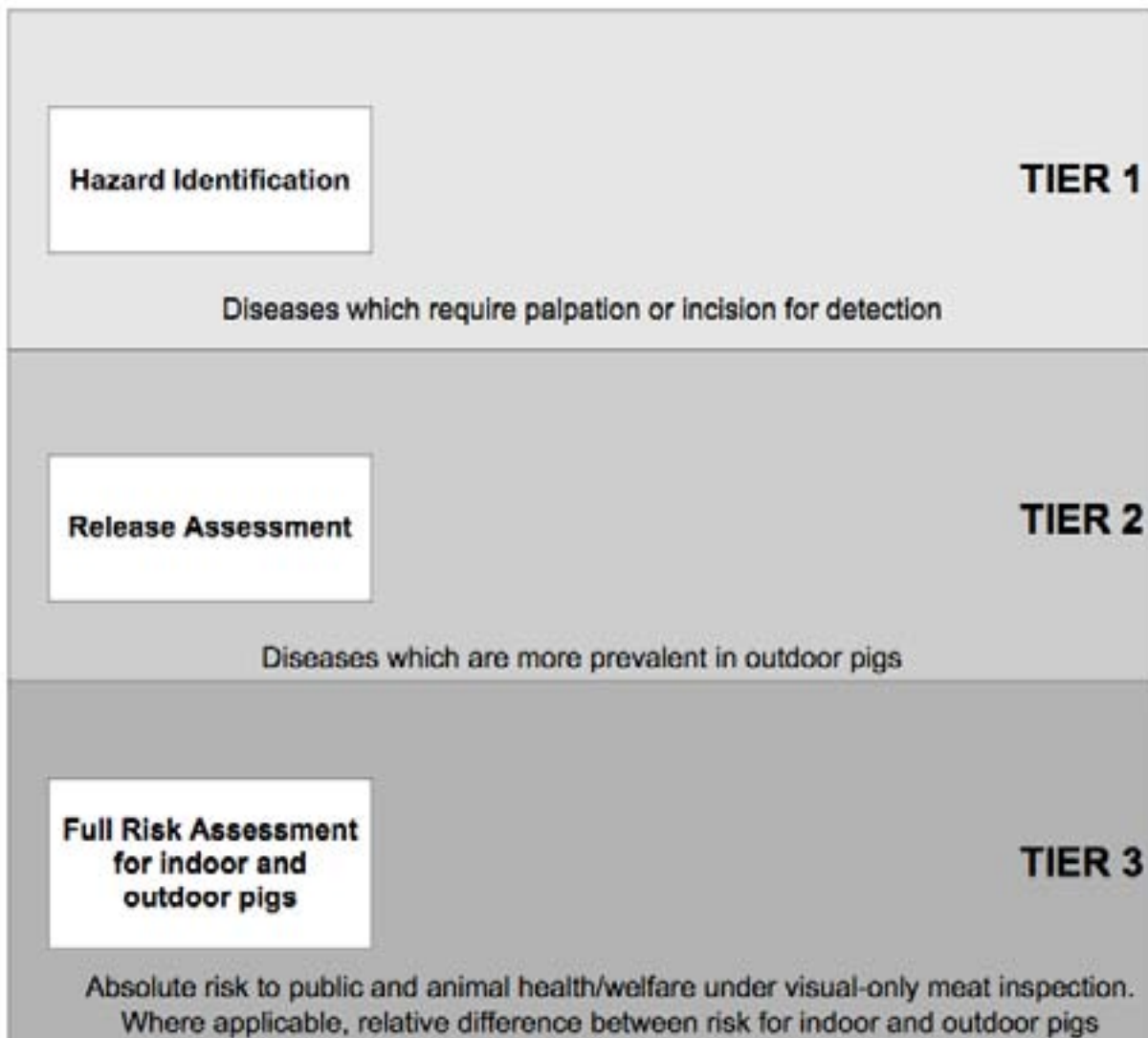
Indoor: Pigs raised indoors since weaning on a quality-assured farm.

Outdoor: Pigs raised outdoors since weaning on a quality-assured farm.

Given that pigs reared indoors since weaning (from integrated production systems) are allowed to be visually inspected, then it would be reasonable to assume that these pigs pose an acceptable risk to public health, animal health and animal welfare. We are therefore interested in whether there is any increased risk, relative to indoor pigs, from visual-only inspection of outdoor pigs, and subsequently what this change in risk means to the absolute risk to public and/or animal health. There are two main criteria that determine whether the risk will change. One, whether the sensitivity of detecting a condition is affected by switching from traditional to visual-only inspection (if not, there is no change in risk). Two, whether a condition of concern is more prevalent in outdoor pigs than indoor pigs (if not, then outdoor pigs pose no greater risk than indoor pigs). The absolute risk to public health is determined by the relationship between the burden of contaminated meat entering the food chain and the rates of human illness attributable to that contaminated pig meat. The absolute risk to animal health is assessed according to whether a potential decrease in the feedback of meat inspection information to indoor or outdoor farmers occurs. In addition to the risk assessment, we also consider, the benefits (if any) of switching to the proposed visual inspection method. Risk-benefit methods are still under development, but we have applied, as far as practically possible, the methods proposed in two recent publications (Hoekstra et al., 2008).

The two frameworks for risk and benefit assessment are shown in detail in Figure 1. Within Tier 1, a comprehensive list of distinct infectious agents and post-mortem conditions was taken from the Veterinary Laboratories Agency's own protocol for post-mortem inspection of submitted carcasses. A number of conditions were eliminated at each stage based on whether or not the risk they posed to public or animal health would be affected by two main criteria stated above. The risk assessment stage is conducted using a modified version of methods described by the OIE for import risk analysis (OIE, 2004). Under traditional OIE guidelines, there are three components: release assessment, exposure assessment and consequence assessment. Under release assessment we first assess the additional rate of carcasses (from indoor or outdoor pigs) that will enter the food chain given visual inspection of pigs with diseases of human or animal importance. Exposure and consequence assessment are treated as one, where we assess for both indoor and outdoor pigs the absolute risk to public or animal health from moving to a visual-only system of meat inspection protocol in UK abattoirs (compared to current traditional meat inspection methods). Finally we conclude with risk estimates, assessing the relative difference in risk between indoor and outdoor pigs based on the burden of relevant conditions in each type of production, and the likely human/animal consequences that occur because of the potentially increased flux of contaminated meat into the food chain, or the decreased rate of reporting of conditions back to farmers.

## RISK ASSESSMENT



## BENEFIT ASSESSMENT

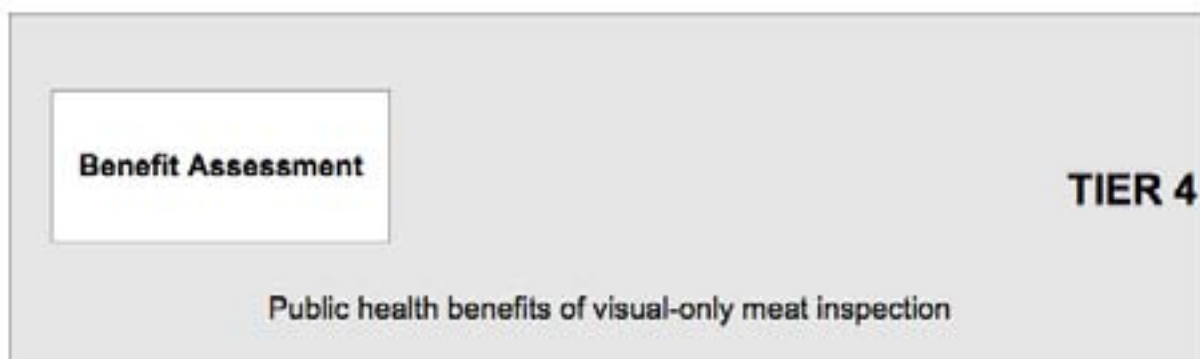


Figure 1: Tiered approach to risk and benefit assessment. Conditions that are unlikely to change in risk given visual inspection methods are identified in Hazard Identification (Tier 1). We conduct a preliminary risk assessment on conditions where risk may potentially change. Given further review, those conditions where risk will probably change are assessed in Tier 3. Benefit assessment is conducted only on those conditions identified for Tier 3 assessment.

## Results

Two conditions were fully assessed under Tier 3, porcine Tuberculosis (pTb) and endocarditis, as the sensitivity of detection of these conditions was judged to be reduced under visual-only meat inspection relative to traditional meat inspection. Using data collected for conditions noted by meat inspectors, and linking that data to the batch's origin (indoor or outdoors), we determined that endocarditis was less prevalent in outdoor pigs than indoor pigs. Hence, the risk to public or animal health is no greater from outdoor pig production than indoor pig production.

Using the same meat inspection data, pTb was identified in 40 pigs (4 from outdoor production) in the period 2007-2010. It was also determined to be more prevalent in outdoor production than indoor production (up to double the incidence rate). Outdoor production is of relatively higher risk than indoor production. However, if visual-only inspection had have been implemented for outdoor pigs in this period, we would have missed only around 4 extra pigs that would have subsequently entered the food chain. Within the UK in the region of 50-100 cases of non *M. tuberculosis* in humans are recorded every year, and the majority of these (mostly *M. bovis*) cases will be epidemiologically linked to raw milk consumption in older persons. The contribution of pig meat consumption to human Tb infection is therefore judged to be negligible, regardless of the meat inspection method used.

We were unable to collect enough evidence to state the effect on animal health and welfare by the reduction in the detection of pTb using visual-only meat inspection, but it is unlikely the non-detection of around 40 pigs in four years would make a huge impact on animal health and welfare. However, given there is no other surveillance method for Tb in pigs than meat inspection, we gave a conservative assessment of risk as very low, rather than negligible. We did not find any conclusive evidence that visual-only meat inspection benefited public health by the reduction of microbiological cross-contamination (because of eliminating incision of the lymph node or heart, for example).

## Discussion

The results of this qualitative risk assessment agree with those produced in a similar Danish risk assessment (Anon., 2008); however, we have also extended the result to outdoor herds as well, and also assessed the effect on animal health/welfare.

There were large data gaps for some crucial aspects of the risk assessment, particularly for animal health and welfare. A major data limitation that would have some bearing on the results of the risk assessment was the meat inspection data used to assess the relative incidence of pTB/endocarditis in indoor and outdoor pigs respectively. We used data collected from an electronic system being trialled in pig slaughterhouses. The results of this data analysis are preliminary, and better, more targeted surveillance is needed to confirm the results. The UK Food Standards Agency is now in the process of funding a study to collect data to fill the gaps identified by the risk assessment.

## Conclusion

We conclude that the public health risk of moving from a traditional post-mortem meat inspection method to a visual-only system is negligible, for both indoor and outdoor production systems. The only non-negligible (very low) risk is that posed to animal health/welfare because of pTb, where meat inspection is the only form of animal surveillance. Moving to a visual-only system would reduce the sensitivity of pTb detection to almost zero. However, the risk was still judged to be virtually negligible because of the small numbers of positive identifications of pTb-pigs.

## References

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